



Beloit Corporation

Toxics Use Reduction Case Study

Coolant Management Leads To Savings

Summary

In 1992, Beloit-Jones Fiber Finishing Systems Division of Beloit Corporation in Dalton, Massachusetts replaced the water-based coolant used in its metalworking operation with a mineral oil-based coolant. This change has nearly eliminated the need to replace coolant made rancid by tramp oil accumulation. The new coolant more than doubled the life of the cutting machines, which in turn doubled productivity of the plant. Beloit found that the change saved more than \$88,000 in coolant purchases and associated machine tooling costs, cutting costs by 28% in the first year and 32% in succeeding years. In addition, the switch eliminated disposal of approximately 5,600 gallons per year of waste coolant.

Background

Beloit Corporation employs nearly 400 people at its Fiber Finishing Systems Division, which manufactures heavy machinery for paper mills, designs paper mills and factories, and rebuilds old machinery. In the manufacturing process, metal stock and large castings are placed in CNC (computer numerically controlled) machines, lathes and milling machines to be cut into the required shape. The cutting tools on the machines are flood-cooled to reduce heat and increase lubricity. Beloit found that the coolant it was using had serious drawbacks. Every two weeks the coolant became rancid due to bacterial growth. Tramp oil floating on the top of the sump prevented aeration, creating an environment in which anaerobic bacteria flourished. As a result, the sump had to be emptied, the coolant filtered in a central area, and the sump recharged. Additionally, the machine operators experienced dermatitis due to contact with the coolant.

Toxics Use Reduction Planning

Plant Engineering Manager Paul Norcross, together with the tool room and maintenance supervisors, began looking for alternatives which would remedy the short life, high disposal costs, poor lubricity and skin irritation problems associated with the coolant.

The first step was to invite representatives from five coolant manufacturers to run tests on machines within the plant. Beloit chose three milling machines, which are used to manufacture identical stainless steel parts. The substitute coolant used in the first machine produced immediate benefits. The operators' skin irritation ceased and the cutting tool ran two to three times longer between changes. After three weeks, the coolant remained unaffected by tramp oil. The other two machines were changed over to different coolants, but dermatitis and poor cutting tool life problems persisted.

Toxics Use Reduction Modification

By the 75th day of the trial, other operators were clamoring for the coolant used on the first machine and all other testing was terminated. The other 37 cutting machines were then systematically switched over to the new coolant with similar positive results.

The change required no operator retraining. Maintenance operators are required to check coolant concentration and make-up levels. An oil skimmer for the tramp oil was added to the sump of each machine, which did not already have such a skimmer, in order to achieve the maximum life from the coolant. The new coolant has eliminated dermatitis problems and increased tool life with no apparent need for disposal, thus reducing maintenance. Operators have been able to increase machine feed rates, yet even with the increased tool use, the savings potential in tool costs is approximately 24% and finished surface quality has improved dramatically.

Results

Reductions: Beloit no longer has to dispose of 5,600 gallons per year of spent coolant. This has reduced the amount of hazardous material, which is disposed of off-site.

Economics: Equipment costs for the wheel skimmers, which were manufactured in-house, amounted to \$9,000. The new coolant costs \$11.34 per gallon, an increase of 47% over the old coolant. However, reduced disposal costs and make-up for spent coolant saves Beloit \$18,000 annually. While difficult to quantify due to a wide variety of operations and materials, maintenance time and costs for the coolant have been reduced. Tool life is now two to two-and-a-half times longer than was achieved with the old coolant. Machine feed rates have increased at a similar rate (from 7 inches/minute to 18 inches/minute), more than doubling productivity. In combination, these factors yielded savings of \$61,200 (24%) annually in cutting tool purchases. Overall, this project generated annual savings of more than \$88,000 in 1993.

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